

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

**BEFORE THE BOARD OF PATENT
APPEALS AND INTERFERENCES**

IN RE APPLICATION OF:

Diane K. Stewart et al.

APPLICATION NO.: 10/758,966

FILED: January 16, 2004

APPEAL NO.: 2009-002769

TITLE:

Electron Beam Processing for Mask Repair

§ **CONFIRMATION NO.:** 6517

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§ **GROUP ART UNIT:** 1792

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§ **EXAMINER:** Allan W. Olsen

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§ **ATTORNEY DOCKET NO.:** F125

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REQUEST FOR REHEARING

U.S. Patent and Trademark Office
Mail Stop- Appeal Brief-Patents
Randolph Building
401 Dulaney Street
Alexandria, VA 22314

In response to the recent DECISION ON APPEAL in the subject application, Appellants submit this Request for Rehearing. This Request is being submitted on or before two months from the date of DECISION (September 23, 2009) and is therefore timely. Appellants request that any fees associated with this Request be charged to Deposit Account 50-1635.

CERTIFICATE OF TRANSMISSION UNDER 37 C.F.R. 1.8

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office, on the date shown below.

On: November 23, 2009

By: 

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I. GROUNDS FOR REHEARING

- A. The Board's Statement of Decision is inconsistent with the body of the opinion.
- B. The Board's rationale for reversing the Examiner's rejection with respect to claims 21 and 22 would also apply to claims 6-9.
- C. The Board's new interpretation of the claim term "substantially unchanged" is not reasonable in light of the Specification.

II. ARGUMENT

Appellant believes the following points to have been misapprehended or overlooked by the Board. While these arguments were not made in Appellants' Appeal Brief, the first two grounds raise specific points about the Board's Decision and the third ground is responsive to a new ground for rejection found in the Decision.

A. The Board's Statement of Decision is inconsistent with the body of the opinion.

In Section II of the Board's Opinion of 09/23/09, the Opinion clearly states that the Examiner reversibly erred in finding that Appellants' claims 1-3, 6-8, and 10-12 were anticipated by Musil. The entire discussion found in Section II makes it clear that the Board agreed with Appellants that Musil does not teach the limitations of the rejected claims. Finally, in the Conclusion to Section II, the Board expressly states:

"Appellants have established that the Examiner reversibly erred in finding that Musil describes a method of restoring the transparency of a quartz material having implanted gallium including a step of directing an electron beam toward the gallium implanted portion at the electron dose required by claim 1."

Opinion of Sept. 23, 2009, at 5.

Nevertheless, in Section IV of the Opinion, the Board states that "[w]e sustain the rejection of claims 1-3, 6-8, and 10-12 as anticipated by Musil." The Board's decision as shown in Section IV is clearly inconsistent with the discussion of anticipation by Musil in Section II of the Opinion. Appellants believe that the statement in Section IV is the result of a typographical error by the Board. Accordingly, Appellants request that the decision of the Board be corrected to state that the rejection of claims 1-3, 6-8, and 10-12 as anticipated by Musil is reversed.

B. The Board's rationale for reversing the Examiner's rejection with respect to claims 21 and 22 would also apply to claims 6-10.

The Board concludes that Stewart does anticipate some of Appellants' claims because the Board interprets the claim requirement that the quartz thickness be substantially unchanged to include removing a layer of quartz 20-40 nm thick. However, the Board notes that claims 21 and 22 require etching to be limited to less than 5 nm and concludes that Stewart does not teach this limitation.

Appellants note that claims 6-9 also contain similar limitations. Claim 6 requires that the thickness of the quartz material changes by less than 2 nm; claim 7 that the thickness changes by less than 5 nm; and claims 8 and 9 that the thickness changes by less than 10 nm. Appellants believe that, at minimum, these claims should be allowable for the same reasons that claims 21 and 22 are allowable. Accordingly, Appellants request that the Board reconsider its decision and that the rejection of claims 6-9 be reversed.

C. The Board's new interpretation of the claim term "substantially unchanged" is not reasonable in light of the Specification.

The Board raises a new justification for the § 102 rejection of Appellants' claims based upon the Stewart reference. Because Stewart teaches milling away the gallium-implanted quartz

and because Musil teaches that gallium is implanted to a depth of 20-40 nm, the Board concludes that Stewart teaches the removal of 20-40 nm of quartz. Further, the Board interprets the requirement in Appellants' claims that the thickness of the quartz be "substantially unchanged" to encompass the 20-40 nm of material removal taught by Stewart.¹

Appellants first note that paragraph 1031 of the Specification contains a typographical error that has remained unnoticed during prosecution of this Application. As noted by the Board, this paragraph, summarizing FIG. 2 of the Application, states that "it appears that removal of about **25 μ m** of quartz was necessary to restore transmission to about 97%." The text should read that the removal of **25 nm** of quartz was necessary to restore transmission to about 97%. Because the Examiner never raised the justification now relied upon by the Board, the error was not noticed by either the Examiner or the Appellants.

In fact, the sentence at issue is merely a description of the graph shown in FIG. 2 and the error is immediately apparent when that figure is examined. FIG. 2 shows that the depth change at an electron dose of $0.2 \text{ n/C}/\mu\text{m}^2$ would be from 95 nm to about 125-130 nm—a difference of about 25 nm, not 25 μ m. The entire scale of the graph of FIG. 2 (left side) is only from 0 to 250 nm and, of course, 25 μ m would be equal to 25,000 nm. Any person of ordinary skill in the art would recognize that the original language is the result of a typographical error and that the actual value should be 25 nm.

¹ While Appellants understand that the Board is attempting to use the quotation from Musil to show facts that would have been known to a person of ordinary skill in the art, Appellants also believe that the Board is mischaracterizing the statement in Musil. The Musil reference states that the gallium atoms typically implant in the target to a depth of between 20-40 nm. As a result, in the invention of Musil, in order to avoid gallium implantation in a mask, the reference teaches stopping ion beam milling with at least 40 nm of material remaining and completing the milling via e-beam etching. The reference absolutely does not suggest that removing only 20 nm of the stained quartz would be sufficient to substantially increase the transmission of the gallium implanted quartz. As a result, the Board's use of the Musil reference would appear to be more appropriate for an obviousness rejection under § 103.

In any event, Appellants believe that the Board has improperly interpreted the claim limitation requiring that the quartz thickness be substantially unchanged to include completely removing the implanted quartz (20-40 nm according to the Board). “The Patent and Trademark Office ("PTO") determines the scope of claims in patent applications not solely on the basis of the claim language, but upon giving claims their broadest reasonable construction ‘in light of the specification as it would be interpreted by one of ordinary skill in the art.’” MPEP § 2111 (*citing In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364, 70 USPQ2d 1827 (Fed. Cir. 2004)). A broad claim interpretation for purposes of examination is not unlimited; it must still be reasonable and consistent with how a skilled person would interpret the claim in light of the specification. In this case, the Board’s interpretation is both unreasonable and inconsistent with the plain language in the claims and Applicants’ specification.

The use of terms of degree like "substantially" has been approved by the Federal Circuit in claim drafting as a way of avoiding strict numerical limits. *Anchor Wall Systems, Inc. v. Rockwood Retaining Walls, Inc.*, 340 F.3d 1298, 1310-11 (Fed. Cir. 2003). While the word "substantially" can admittedly have different meanings in different contexts, in this case the word is obviously used as a term of approximation. The relevant plain meaning of “substantially” is “largely but not wholly that which is specified.” *York Prods., Inc. v. Cent. Tractor Farm & Family Ctr.*, 99 F.3d 1568, 1572-73 (Fed.Cir.1996) (*quoting* WEBSTER'S NINTH NEW COLLEGIATE DICTIONARY 1176 (9th ed. 1983)). When read in light of the Specification, it would be clear to any person of ordinary skill in the art that the rejected claims all require that the quartz thickness be "largely but not wholly" unchanged.

Appellants' Specification repeatedly states that removing implanted quartz on a phase shift mask is undesirable because it "changes the thickness of the substrate, which in turn

changes the phase of the transmitted light." (Spec. at ¶ 1005; see also ¶ 1007 and 1024). An object of Appellants' invention is to repair a mask with implanted quartz by restoring transmission while minimizing the undesirable effects of quartz removal. (Spec. at ¶ 1006-1007). No person of ordinary skill in the art would ever interpret the requirement that the quartz thickness be substantially unchanged as including the removal of the entire layer of implanted quartz because that would defeat the object of the invention.

Appellants also note that the Specification contains a number of examples of material removal which fits within the requirement that the thickness be substantially unchanged. For example, FIG. 1 shows an increase in quartz depth (in other words, a decrease in thickness) that ranges from approximately 2 nm (at 0.6 n/C/μm²) to approximately 10 nm (at 0.9 n/C/μm²). (See Spec. at ¶ 1028-1029). FIGS. 11C and 11D also show trenches that were cleaned according to the present invention where transparency was restored to 93% or greater while the quartz thickness did not decrease at all. FIG. 2, on the other hand, shows a decrease of about 5 nm at 0.10 n/C/μm², but at a dose of 0.20 n/C/μm², 25 nm of quartz is removed to restore transmission to 97% and the Specification categorizes this degree of removal as a change in thickness. (Spec. at ¶ 1031).

These examples also make it clear that the definition of "substantially unchanged" would not cover the removal of the entire layer of gallium stained quartz. Any person of ordinary skill, interpreting the limitation in light of the Specification, would thus understand that the upper limit for "substantially unchanged" thickness to be around 10 nm. The interpretation adopted by the Board would double this value and make the limitation requiring that the quartz thickness be "substantially unchanged" equivalent to removing the entire gallium-implanted layer of quartz. Such an interpretation not only would be completely inconsistent with Appellants' Specification,

it would also defy the common usage of the words in the rejected claims. Certainly, no person of ordinary skill in the art would understand the limitation to include removing as much as 20-40 nm of quartz because removing that much material would greatly alter the phase shift and defeat the purpose of Appellants' invention.


Accordingly, Appellants request that the Board reconsider its decision and reverse the Examiner's rejection of claims 1-12 as anticipated by Stewart.

III. CONCLUSION

For the reasons given above, Appellants request that the Board of Patent Appeals and Interferences reconsider the decision of Sept. 23, 2009, affirming-in-part the decision of the Examiner and instead reverse the Examiner's rejection of all of the rejected claims.

Respectfully Submitted,

Date: 11/23/09

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